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PATIENT GUIDE

Vitamin and lipotropic injections

B12, vitamin D, biotin and lipotropics

Vitamin B12 and vitamin D injections can correct a deficiency found on testing. Biotin and lipotropic injections have far less research behind them.

PRODUCTS	FDA APPROVED	ROUTE	BEST USE	SOURCES
Four injections	Vitamin B12 only	Injection	Low level on testing	33 · PMID linked

§ 01

Overview

Vitamin injections are among the most requested treatments in wellness medicine, and the four on our menu rest on very different evidence. Vitamin B12 injection is an FDA approved treatment for B12 deficiency and has been used for decades.[24] [25] Vitamin D injection can raise a low level found on a blood test, though no injectable vitamin D3 or D2 product is FDA approved in the United States.[1] [26] Biotin and lipotropic injections are compounded. The one placebo controlled trial of biotin for hair growth found no difference from placebo,[2] and we found no controlled trial of a lipotropic injection for weight loss.

Each of these nutrients matters most when the body is short of it, so the research is strongest for correcting a deficiency that a blood test has found.[3] [4] Every number below comes from a published study, a guideline or an FDA document, listed at the end with a link.

1,000 mcg	**Daily B12 tablets matched injections in raising B12 levels.** In a Cochrane systematic review of three randomized trials in 153 people with deficiency, 1,000 mcg of oral B12 a day gave no clinically relevant difference in B12 levels compared with injections. The reviewers rated the evidence low quality.[5]
20 ng/mL	**A vitamin D level that meets most people's needs.** The Institute of Medicine found that a 25 hydroxyvitamin D level of at least 20 ng/mL meets the requirements of at least 97.5 percent of the population.[6]
39%	**Of biotin based lab tests showed interference.** When six healthy adults took 10 mg of biotin a day for a week, 9 of the 23 laboratory tests that use biotin chemistry gave results affected by it.[7]
None found	**Controlled trials of lipotropic injections for weight loss.** Our search of the medical literature found no randomized trial of the combined injection. Single ingredients have been studied in other forms and settings, described in §04.[8]

§ 02

What these injections are

All four are small injections of nutrients the body normally gets from food. They differ in what is in the vial, what the FDA has approved and how much research stands behind them.

Vitamin B12

Vitamin B12, or cobalamin, is needed for growth, for making blood cells, and for building DNA and myelin, the sheath that protects nerves.[24] It occurs naturally only in foods of animal origin, so a strict vegan diet supplies none.[24] The usual injection is cyanocobalamin, an FDA approved form that is absorbed quickly and completely from the muscle or from deep under the skin.[24] Hydroxocobalamin is a second FDA approved injectable form, given into the muscle, and the cyanocobalamin label describes the two as equally effective.[25][24] Methylcobalamin, another natural form sold as a supplement,[9] is also compounded as an injection, and it is not an FDA approved drug.[26]

Vitamin D

Vitamin D3 (cholecalciferol) is made in the skin under ultraviolet light, and vitamin D2 (ergocalciferol) is derived from a plant sterol.[10] Both are inactive until the body converts them, first to 25 hydroxyvitamin D and then to the hormone 1,25 dihydroxyvitamin D.[10] The blood test for vitamin D status measures 25 hydroxyvitamin D.[4] Vitamin D injections are prepared by compounding pharmacies, because no single ingredient vitamin D3 or D2 injection is FDA approved in the United States.[26]

Biotin

Biotin, also called vitamin B7 or vitamin H, is a water soluble B vitamin that works as a cofactor for enzymes involved in handling fats and amino acids and in making new glucose.[11] The recommended daily intake is 0.03 mg.[27] Biotin is one ingredient of FDA approved intravenous multivitamins used in hospital nutrition, but a biotin injection on its own is not an FDA approved product.[26]

Lipotropic injection

A lipotropic injection is a compounded mix of nutrients involved in how the liver handles fat. Common formulations combine methionine, inositol and choline, sometimes with vitamin B12, and the exact contents vary from one pharmacy to another, so your physician can tell you what the product prescribed for you contains. Methionine is an amino acid. Inositol is a sugar alcohol and a component of the phospholipids in cell membranes.[8] Choline was recognized as an essential nutrient by the Institute of Medicine in 1998; it is needed for cell structure and for making a nerve signaling chemical, and low intake has been linked to liver disease.[12] No lipotropic injection is FDA approved.[26]

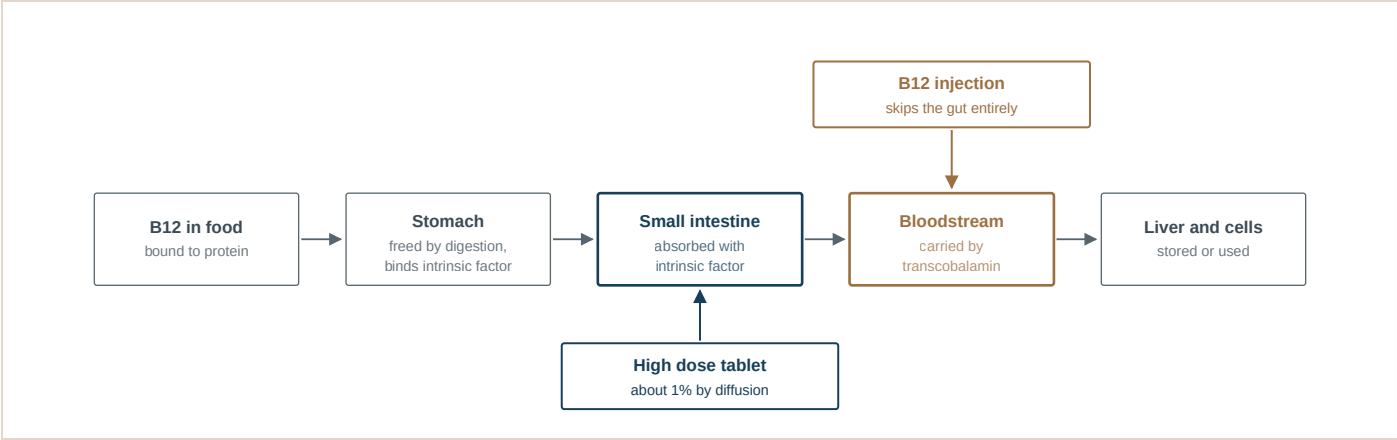
THE FOUR INJECTIONS AT A GLANCE

	VITAMIN B12	VITAMIN D	BIOTIN	LIPOTROPIC
What is in it	Cyanocobalamin or hydroxocobalamin; sometimes methylcobalamin[24][25]	Cholecalciferol (D3) or ergocalciferol (D2)[10]	Biotin (vitamin B7)[11]	Varies: methionine, inositol, choline, sometimes B12
FDA approved injection	YES cyanocobalamin and hydroxocobalamin[26]	NO[26]	NO[26]	NO[26]
How it is given	Into the muscle or deep under the skin[24]	Into the muscle in the published trials[1]	Injection; no published studies	Usually into the muscle; no published studies

§ 03

How they work

Vitamin B12 in food is bound to protein and is released by normal digestion.[24] It then binds intrinsic factor, a protein secreted by the stomach lining, and is absorbed in the last part of the small intestine before transport proteins called transcobalamins carry it in the blood. [24] [25] A problem at any step can cause deficiency: pernicious anemia, in which intrinsic factor is missing, stomach or bowel surgery, bowel disease, and long term use of some medicines that lower stomach acid or blood sugar. [24] [13] [14]



Most B12 deficiency is a problem of absorption, and an injection goes around it. Food B12 must be freed by digestion and bound to intrinsic factor before it can be absorbed, while an injection delivers it straight to the blood. A large daily tablet can also work because a small share is absorbed without intrinsic factor.[24] [5]

An injection places B12 straight into the bloodstream, so it works even when intrinsic factor is missing.[24] A tablet depends on a second, much smaller route, in which about 1 percent of a swallowed dose is absorbed by simple diffusion; the label notes this is enough only with very large doses. [24] Daily tablets of 1,000 mcg use this route, and trials show they can correct deficiency in many people. [5] Inside the body, every form of B12, cyanocobalamin and methylcobalamin included, is reduced to the same core molecule and then converted to the two active forms cells use, in a ratio that does not depend on the form taken. [9]

Vitamin D from the skin, food, a tablet or an injection is converted to 25 hydroxyvitamin D and then to 1,25 dihydroxyvitamin D, the hormone that binds the vitamin D receptor and regulates hundreds of genes.[10] An injection into the muscle seems to release vitamin D slowly. [15] In a trial in older adults, blood levels after a single injection were still rising at 12 weeks, while levels after the same dose by mouth peaked earlier and had begun to fall. [1]

Biotin is a cofactor for enzymes called carboxylases.[11] Many laboratory tests use biotin as a chemical tag, because it binds very tightly to a protein called streptavidin, and extra biotin in a blood sample can interfere with that binding and change the result. [7] Among the lipotropic ingredients, choline is needed to keep fat from building up in the liver: in people fed entirely by vein for years, low choline was linked to fatty liver, and adding choline chloride to their feeding reversed it. [16] Inositol takes part in cell signaling and in how cells respond to insulin. [8] None of these studies tested whether extra amounts reduce body fat in people whose levels are already normal.

KEY POINT

An injection helps most when the body cannot absorb a vitamin or is short of it. In people without deficiency, a review of 16 randomized trials found that B12 did not improve memory, thinking or mood,[3] and the controlled evidence for biotin in hair growth shows no benefit. [2] A blood test is the natural starting point.

§ 04

What the research shows

The evidence ranges from FDA labels and randomized trials for vitamin B12 to a near absence of research on lipotropic injections.

What the evidence supports

Vitamin B12 corrects deficiency, by injection or by high dose tablet. Injected B12 is the FDA labeled treatment for B12 deficiency caused by poor absorption, including pernicious anemia, stomach or bowel surgery and bowel disease.[24] In a Cochrane systematic review, 1,000 mcg a day by mouth raised B12 levels with no clinically relevant difference from injections, and one trial using 2,000 mcg a day found higher levels with tablets; the reviewers rated this evidence low quality because the trials were few and small. [5] In a later trial of 283 adults aged 65 and over with deficiency, more than 90 percent reached normal levels by week 8 with either 1 mg tablets or 1 mg injections, and 83.4 percent preferred tablets; by week 52 the injection group did somewhat better (80.4 against 73.6 percent). [17]

Several common medicines lower B12. In 25,956 people with B12 deficiency, two or more years of proton pump inhibitors was linked to higher odds of deficiency (odds ratio 1.65).[13] After 13 years in the Diabetes Prevention Program, low or borderline B12 was found in 20.3 percent of people on metformin against 15.6 percent in the original placebo group. [14]

Vitamin D injections raise low levels, and so do oral doses. In 66 adults aged 65 or older living in a nursing home with levels below 30 ng/mL, a single 600,000 IU dose of vitamin D3 raised the average level from 11.76 to 52.34 ng/mL at 12 weeks by injection, and from 14.87 to 42.94 ng/mL by mouth. All of the injection group and 83.3 percent of the oral group ended at 30 ng/mL or above.[1] In 100 adults below 20 ng/mL, one dose of 200,000 or 600,000 IU, by injection or by mouth, corrected the deficiency at 2 months in 70.6 to 93.8 percent of people, with the highest rate after the 600,000 IU injection. [18] In 40 healthy adults with deficiency, one 300,000 IU injection and five weekly oral doses of 60,000 IU gave similar levels at 6 weeks, and the injection gave higher levels at 12 weeks (25.46 against 16.66 ng/mL). [15]

Specialist groups favor daily oral vitamin D for most people. A 2024 international consensus statement concluded that oral vitamin D is the preferred route and that injection is reserved for specific clinical situations.[19] The Endocrine Society's 2024 guideline, written for people without an established reason for vitamin D treatment or testing, suggests against routine vitamin D testing in the general population. For people over 50 who need vitamin D, it suggests daily doses in place of intermittent high doses. [4]

Choline replacement reverses the fatty liver of choline deficiency. In a placebo controlled trial in 15 people on long term intravenous feeding, adding 2 g of choline chloride a day for 24 weeks improved liver fat on CT scans and lowered the liver enzyme ALT. Fatty liver returned 10 weeks after choline was stopped.[16]

What is not yet known

Vitamin B12 without deficiency. B12 injections are often requested for energy. A systematic review and meta analysis of 16 randomized trials in 6,276 people without overt deficiency or advanced neurological disease found no effect of B12 on any area of thinking and memory and no overall effect on depression. Only one trial measured unexplained fatigue, too few to analyze.[3]

Vitamin D injections and long term outcomes. The injection trials above were small and measured blood levels over weeks to months. Very large doses given once a year did not prevent fractures in older adults. An injection of 300,000 IU of vitamin D2 every autumn for 3 years in 9,440 adults aged 75 and over did not lower fractures, and hip fractures were more frequent in the vitamin D group (hazard ratio 1.49).[20] An annual oral dose of 500,000 IU in 2,256 women aged 70 and over increased falls by 15 percent and fractures by 26 percent. [21] The ideal blood level is still debated, and the Institute of Medicine found that higher levels were not consistently linked to greater benefit. [19] [6]

Biotin for hair and nails. A 2017 review found 18 reported cases in which biotin helped hair or nails, and every one of those patients had an underlying condition affecting hair or nail growth; the authors found too little evidence to support biotin in healthy people.[22] A second 2017 review found no randomized trial of biotin for hair quality or quantity,[11] and a 2024 review found that the one double blind, placebo controlled trial of oral biotin for hair growth showed no difference from placebo.[2] Small studies in people with brittle nails have reported firmer, thicker nails with oral biotin, and their reviewers call for larger trials with control groups.[23] We found no published study of biotin by injection for hair or nails.

Lipotropic injections for weight loss. We searched the medical literature and found no controlled trial of a lipotropic injection, with or without B12, for weight loss or for any other outcome. The nearest evidence concerns single ingredients taken in other ways. A systematic review and meta analysis of 15 controlled trials of inositol taken by mouth found an average reduction in body mass index of 0.41 kg/m², with larger effects in people with polycystic ovary syndrome and in people with overweight or obesity.[8] The choline trial above was in people with a documented lack of choline on intravenous feeding.[16]

MAIN HUMAN STUDIES Randomized trials unless noted.

STUDY	N	WHO AND HOW	MAIN FINDING
Cochrane review 2018[5]	153	Systematic review of 3 trials, B12 deficiency; oral against injected B12	1,000 mcg a day by mouth: no clinically relevant difference in B12 levels; low quality evidence
OB12 2020[17]	283	Adults 65 and over with deficiency; 1 mg oral or 1 mg injected for 52 weeks	Over 90 percent normal at week 8 in both groups; 73.6 against 80.4 percent at week 52
Markun 2021[3]	6,276	Meta analysis of 16 trials, no overt deficiency	No effect on thinking, memory or depression; fatigue too little studied
Tellioglu 2012[1]	66	Adults 65 and over, level below 30 ng/mL; one 600,000 IU dose, injected or oral	12 weeks: 52.34 ng/mL injected, 42.94 ng/mL oral
Smith 2007[20]	9,440	Adults 75 and over; 300,000 IU vitamin D2 injected yearly for 3 years	No fewer fractures; more hip fractures (hazard ratio 1.49)
Sanders 2010[21]	2,256	Women 70 and over; 500,000 IU oral once a year	15 percent more falls and 26 percent more fractures
Buchman 2001[16]	15	Long term intravenous feeding; 2 g choline chloride a day for 24 weeks	Less liver fat and lower ALT than placebo; fat returned after stopping
Zarezadeh 2022[8]	15 trials	Meta analysis of oral inositol	Body mass index 0.41 kg/m² lower; larger effect in polycystic ovary syndrome

SUMMARY

Vitamin B12 injection is an established, FDA approved treatment for B12 deficiency, and high dose tablets also work for many people. Vitamin D injections raise low levels, though two major specialist statements favor daily oral vitamin D for most people. For biotin and lipotropic injections, the research does not show a benefit in people who are not deficient, and biotin can distort some blood tests.

§ 05

How they are given

The doses below come from an FDA label where one exists and otherwise from the published studies. Where neither sets a dose, your physician sets it with you.

Vitamin B12 injection

Cyanocobalamin is given into the muscle or deep under the skin. The label advises against giving it into a vein, because almost all of the vitamin is then lost in the urine.[24] Even after a muscle injection, 50 to 98 percent of a 100 or 1,000 mcg dose may appear in the urine within 48 hours, most of it in the first eight hours. [24]

CYANOCOBALAMIN FOR PERNICIOUS ANEMIA From the FDA approved label.[24]

STAGE	DOSE BY INJECTION
First 6 or 7 days	100 mcg daily
If the blood is responding	100 mcg on alternate days for 7 doses
Next 2 to 3 weeks	100 mcg every 3 to 4 days
After that	100 mcg monthly for life

For people with normal absorption whose deficiency is severe, the label allows a similar start, followed by long term treatment with oral B12.[24] Hydroxocobalamin is given only into the muscle, at 30 mcg daily for 5 to 10 days and then 100 to 200 mcg monthly. [25] Trials have also used 1 mg (1,000 mcg) injections, for example on alternate days for two weeks, weekly to week 8 and then monthly. [17] Methylcobalamin injections are compounded and have no FDA label dose. [26]

Vitamin D injection

No vitamin D3 or D2 injection is FDA approved, so there is no label dose.[26] In the published trials, adults with low levels received a single injection of 200,000 to 600,000 IU of vitamin D3 into the muscle. [1] [18] [15] For scale, the Institute of Medicine's recommended daily intake is 600 IU from age 1 to 70 and 800 IU from age 71. [6] Very large doses given once a year have been linked to more falls and fractures in older adults (see §07), so your physician sets the dose and timing from your blood level and your history. [21] [20] Daily tablets are the alternative that specialist groups prefer for most people. [19] [4]

Biotin injection

No regulator has set a dose for biotin by injection, and we found no published study that tested one, so the dose is set by your physician. For scale, the recommended daily intake is 0.03 mg, and the FDA is aware of many supplements containing 20 mg of biotin and some containing up to 100 mg per pill.[27]

Lipotropic injection

Lipotropic injections are compounded, and their contents vary by pharmacy. No regulator has set a dose and no published trial has tested one, so your physician sets it. If you also receive B12 injections, ask whether your lipotropic product contains B12 as well, so that your total dose is clear.

§ 06

What to expect

The injection itself. Some soreness where the needle went in is possible, and the hydroxocobalamin label notes that a few patients feel pain after the injection.[25]

Vitamin B12. In true deficiency the blood responds quickly. A rise in young red blood cells, called reticulocytes, usually appears between the third and tenth day of treatment,[25] and the label expects blood counts to be normal by the end of its first phase of daily, alternate day and twice weekly doses. [24] Nerve symptoms can take longer, and deficiency left untreated for more than three months may cause permanent damage to the spinal cord, which is one reason treatment starts promptly once a deficiency is found. [24] If your B12 is already normal, the trials give no reason to expect a change in memory or mood. [3]

Vitamin D. Blood levels rise over weeks. After a single 600,000 IU injection in older adults, the average level was 32.72 ng/mL at 6 weeks and 52.34 ng/mL at 12 weeks.[1]

Biotin and lipotropic injections. The studies give no timeline for hair, nail or weight changes, because they did not show a benefit in people without deficiency or did not measure one.[2] [22] If weight is your goal, your physician can talk through treatments with trial evidence, such as the FDA approved medicines in our semaglutide and tirzepatide guides (OCW WP 023 and OCW WP 024).

§ 07

Safety

Vitamins are familiar, which can make an injection seem free of risk. Each of these products has its own safety points.

Vitamin B12

REACTIONS LISTED ON THE CYANOCOBALAMIN LABEL The label does not give how often each occurs.[24]	
AREA	REPORTED REACTION
Allergy	Anaphylactic shock and death have been reported with injected B12
Heart and lungs	Fluid on the lungs and heart failure early in treatment; blood clots in peripheral vessels
Blood	Polycythemia vera (overproduction of red cells)
Other	Mild, passing diarrhea; itching; a passing rash; a feeling of swelling of the whole body

- **Allergy and cobalt.** Sensitivity to cobalt or to B12 rules out the injection, and the label recommends a skin test dose for anyone suspected of being sensitive.[24]
- **Potassium.** When severe megaloblastic anemia is treated intensely, low potassium and sudden death may occur, so potassium is watched closely for the first 48 hours.[24]
- **Leber's disease.** People with early Leber's hereditary optic nerve atrophy who were treated with cyanocobalamin suffered severe and swift loss of the optic nerve.[24]
- **Folic acid.** Folic acid above 0.1 mg a day can correct the blood count in B12 deficiency while nerve damage continues, so it should never replace B12.[24]
- **Ingredients.** The vial contains benzyl alcohol, and the label warns that its aluminum content can build up to toxic levels with prolonged use when kidney function is impaired.[24]

Vitamin D

In the 600,000 IU trial, 6 participants (9.6 percent) developed excess calcium in the urine, and no significant adverse events were seen.[1] The larger concern is very high doses given at long intervals. Once yearly doses were followed by 15 percent more falls and 26 percent more fractures in older women taking 500,000 IU by mouth, [21] and by more hip fractures in older adults given 300,000 IU of vitamin D2 by injection. [20] The Endocrine Society suggests daily doses over intermittent high doses for people over 50 who need vitamin D. [4]

Biotin

The main risk with biotin concerns the accuracy of blood tests. In November 2019 the FDA updated its 2017 safety communication to warn that biotin can cause falsely high or falsely low results, depending on the test, and that a falsely low result for troponin, a marker used to diagnose heart attacks, may lead to a missed diagnosis.[27] The FDA had received a report that one patient taking high levels of biotin died following low troponin test results. [27] Hormone tests can be affected as well, and the tests examined in the study of healthy adults included thyroid hormones and 25 hydroxyvitamin D. [27] [7] The

FDA states that there is not enough information to know whether stopping biotin for any number of hours before a test prevents a wrong result. [27] Tell your physician and anyone drawing your blood that you take biotin, and if you ever need emergency care for chest pain, tell the team.

Lipotropic injection

There are no published safety studies of lipotropic injections, and the combination has not been tested in a trial. Compounded drugs are not FDA approved, and the FDA does not verify their safety, effectiveness or quality before they are marketed. [28] Please report any reaction to your physician.

TELL YOUR PHYSICIAN BEFORE STARTING IF ANY OF THESE APPLY

- You have pernicious anemia, have had stomach or bowel surgery, or have a bowel condition that affects absorption. [24]
- You have ever reacted to a B12 injection, or you are sensitive to cobalt. [24]
- You or a family member has Leber's hereditary optic neuropathy. [24]
- You take folic acid, metformin, or acid reducing medicines such as proton pump inhibitors. [24] [14] [13]
- You have heart failure, kidney disease, kidney stones or a history of high calcium.
- You take biotin in any form, including hair, skin and nail supplements, or you have blood tests coming up. [27]
- You are pregnant, planning a pregnancy or breastfeeding.
- You take any prescription medicine, over the counter product or supplement. Please bring the full list.

Cyanocobalamin has a long record of use, and the label notes no evidence from long term use in pernicious anemia that it causes cancer. [24] For compounded vitamin D, biotin and lipotropic injections, no long term safety studies exist at the doses used in clinics.

§ 08

Is this right for you

A vitamin injection makes the most sense when there is a reason for it, usually a low level or a condition that blocks absorption. Your consultation is where we work that out together.

Before we begin

- [ ] A review of your medical history, diet, current medications and supplements, including any biotin
- [ ] Relevant measurements such as weight and blood pressure, so we have a clear starting point
- [ ] Baseline bloodwork, so that anything we see later can be compared against where you began
- [ ] A written note of your goals and how you want to feel, so we can judge progress together

If a blood test shows low B12, the next step is to find out why, because a cause such as pernicious anemia, a medicine or a bowel condition changes the plan. The label notes that some causes can be treated directly, which removes the need for long term injections. [24]

Reviewing your progress

We will reassess against your documented starting point at defined intervals, using a repeat blood level where that is the measure of success. You are welcome to stop at any time.

QUESTIONS TO ASK YOUR PHYSICIAN

Is my level actually low, and what is causing it? Would a tablet work as well as an injection for me? How long will I need treatment, and when will we recheck my blood? Does anything I take, including biotin, affect my test results?

§ 09

Regulatory status

Vitamin B12. Cyanocobalamin injection is FDA approved for vitamin B12 deficiency due to malabsorption, including pernicious anemia, disease or surgery of the stomach or bowel, fish tapeworm infestation, cancer of the pancreas or bowel, and folic acid deficiency.[24] Hydroxocobalamin injection is FDA approved for pernicious anemia and other forms of B12 deficiency, [25] and cyanocobalamin is also approved as a nasal spray. [26] Using B12 injections in a person whose B12 is normal would be off label, which a physician may lawfully prescribe after discussing it with you. Methylcobalamin is not an FDA approved drug, and the FDA lists it among the substances nominated for pharmacy compounding that it is still evaluating. [29]

Vitamin D. No single ingredient vitamin D3 or D2 injection is FDA approved in the United States. Injections of active vitamin D hormones such as calcitriol and paricalcitol are approved for people with chronic kidney disease on dialysis, a different use, so vitamin D injections for low levels are compounded.[26]

Biotin and lipotropic injections. Neither is an FDA approved product.[26] Compounded drugs are not FDA approved, and the FDA does not verify their safety, effectiveness or quality before they are marketed. [28] Under section 503A of the federal Food, Drug, and Cosmetic Act, a licensed pharmacy compounding on a prescription may use a bulk ingredient that meets a USP or National Formulary standard, is a component of an FDA approved drug, or appears on the FDA's 503A bulks list. [30] Cyanocobalamin, cholecalciferol and biotin are each components of FDA approved drugs. [26] Choline chloride and methylcobalamin are on the FDA's list of nominated substances still under evaluation, last updated 14 May 2026, and the FDA has not made a final decision on them. [29]

For athletes. None of these vitamins or nutrients is named on the World Anti Doping Agency's 2026 Prohibited List. The list does prohibit intravenous infusions or injections of more than a total of 100 mL in any 12 hour period, except those received during hospital treatment, surgery or clinical diagnostic investigations.[31]

If you would like details about the preparation used in your treatment, please ask.

§ 10

Common questions

Are these injections FDA approved?

Cyanocobalamin and hydroxocobalamin, the usual forms of B12 injection, are FDA approved for B12 deficiency.[24] [25] Vitamin D, biotin, methylcobalamin and lipotropic injections are compounded and not FDA approved. [26] If you would like details about the preparation used in your treatment, please ask.

I feel tired all the time. Will a B12 shot help?

If tiredness comes from B12 deficiency, treating the deficiency is well supported, and the blood usually starts to respond within days.[24] [25] In people without deficiency, a review of 16 randomized trials found no effect of B12 on thinking, memory or mood, and fatigue had been measured in only one trial. [3]

Do I need an injection, or would a tablet work?

For low B12, daily 1,000 mcg tablets raised levels about as well as injections in a Cochrane review, though the evidence was rated low quality.[5] The FDA label prefers injections for pernicious anemia, where tablets are considered unreliable.[24] For vitamin D, specialist groups prefer daily tablets for most people.[19]

Will biotin make my hair or nails grow?

The one placebo controlled trial of oral biotin for hair growth found no difference from placebo, and the reported cases of benefit were in people with an underlying condition.[2] [22] Small studies in brittle nails reported firmer, thicker nails, and reviewers have called for larger trials with control groups.[23] No study has tested biotin by injection for hair or nails.

Do lipotropic injections help with weight loss?

We found no controlled trial showing that lipotropic injections cause weight loss. Oral inositol lowered body mass index by an average of 0.41 kg/m² in a meta analysis, mostly in people with polycystic ovary syndrome or overweight,[8] and choline reversed fatty liver only in people who lacked it.[16]

I take biotin. What should I do before blood work?

Tell your physician and the laboratory, because biotin can make some results falsely high or falsely low, including troponin, a test used to diagnose heart attacks.[27] The FDA states there is not enough information to know whether stopping biotin for a set number of hours before a test prevents a wrong result, so your physician will advise you.[27]

How will we know if it is working?

For B12 and vitamin D, the clearest measure is a repeat blood level compared with your starting point, and in B12 deficiency the blood count as well.[24] For biotin and lipotropic injections there is no blood test that shows a benefit, so you and your physician compare how you are doing against the goals you wrote down at the start.

Where is a compounded medicine made, and who oversees it?

Federal law sets out two kinds of compounding. Under section 503A, a state licensed pharmacy or physician prepares a medicine for one patient against that patient's own prescription, and the state board of pharmacy carries the day to day oversight while the FDA inspects for cause and on surveillance.[28] Under section 503B, an outsourcing facility registers with the FDA, works to federal manufacturing quality standards, reports adverse events and the products it makes to the agency, and is inspected by the FDA on a risk based schedule; it may also supply a clinic directly rather than for one named patient.[32] We use both kinds, and which one prepares your medicine depends on the preparation.

Is a compounded medicine the same as an FDA approved one?

No, and this guide covers both kinds. The B12 injections are FDA approved products, and the vitamin D, biotin and lipotropic injections are compounded from ingredients that are themselves components of approved medicines,[26] while the compounded preparation itself is not FDA approved, so an approved product is the first choice whenever one fits your situation.[28] What a prescription from a licensed pharmacy or a registered outsourcing facility does give you is a named prescriber, a facility answerable to a state board or to the FDA, ingredients that meet federal requirements, and a route for reporting a problem. A vial bought online and labelled for research use only has none of that, and the FDA treats those products as unapproved new drugs when they are meant for people and has written to the companies selling them, so please do not use one.[33]

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